BINDURA UNIVERSITY OF SCIENCE EDUCATION

DEPARTMENT OF ENVIRONMENTAL SCIENCE

AN ASSESSMENT OF THE KNOWLEDGE, ATTITUDES AND PRACTICES OF REGISTERED FOOD RESTAURANTS OWNERS TOWARDS FOOD HYGIENE A CASE STUDY OF RUSAPE TOWN.

SAMANTHA MUSENDE

B201717B

A DISSERTATION SUBMITTED IN PARTIAL FULFILMENT OF THE REQUIREMENTS OF THE BACHELOR OF SCIENCE HONOURS DEGREE IN SAFETY, HEALTH AND ENVIRONMENTAL MANAGEMENT.

SUBMITTED JUNE 2024

DECLARATION

I **SAMANTHA MUSENDE** declare that this dissertation was a result of my own original efforts and investigations, and such work has not been presented elsewhere for any degree or any university programme. All other sources of information have been acknowledged in form of references.

SAMANTHA MUSENDE

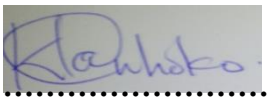
Registration Number: **B201717B**

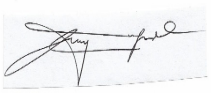
Signature S. Musende……

Date…2/10/24…….

To be compiled by the supervisor

This dissertation is suitable for submission to the faculty and has been checked for conformity with the faculty guidelines.

Signature of Supervisor……  **Date 2/10/24…….**

Chairman  **……**

Date…….

DEDICATION

I would like to dedicate this project to my parents, Mr. M. Musende and Mrs. J. Musende and my siblings for supporting me throughout the endeavours of my learning period.

ACKNOWLEDGEMENTS

I give thanks to God for giving me the opportunity to carry out this project. I would also like to express my sense of obligation to Rusape Town Council for giving me the permission to conduct this research project. My sincere gratitude to my academic supervisor, Mr. P. Nhokovedzo for his support, guidance and equipping me with knowledge to conduct this study. Special thanks to my university lecturers and Delta Beverages Private Limited Sorghum SHE team for their guidance and mentorship to ensure the success of my degree. I would like to thank my family and friends for believing in me and for their motivation throughout my learning period. Above all, I would like to give thanks to the Lord Almighty for making my dream come into reality.

ABSTRACT

COVID-19 generated an improvement on food safety and hygiene sector through improved good hygienic practices. Despite being equipped with food safety regulations (Food and Food Standards Act Chapter 15:04), cases of food borne illnesses have been on a rise in small towns in Zimbabwe. This study aimed to evaluate food workers' practices, attitudes, and expertise in registered food restaurants including the relationship between food safety knowledge and hygiene. Data was collected from 25 randomly chosen food handlers using a questionnaire. SPSS was used for data analysis including a pilot test prior to data collection to reduce bias. One way ANOVA test was conducted using years of experience as the independent factor.

Majority of food handlers proven to have knowledge on food safety and hygiene as 96% knew that cleaning utensils reduces that risk of food contamination whilst 72% had knowledge that cross-contamination occurs when micro-organisms food handlers spread from contaminated food. Most food handlers have a positive attitude regarding food safety and cleanliness as 100% respondents agreed that their goal in business is safe food provision and 80% indicating that medical examinations should be conducted in every six months. The food handlers shown to have good food safety and hygiene practices as over 80% of the food handlers received training and are taken for job inductions before work. Socio-demographic information of the food handlers under study (highest educational level) influence the knowledge, attitude and practices of food handlers ($p > 0.05$ and $f < 1$). There is strong positive relationship between knowledge and food safety attitude and practices in food preparation and serving.

Demographic information has a great impact on the understanding, attitude and food handler procedures in regard to safe food provision. Trainings on food safety and hygiene influence an individual’s attitude and practice in safe food provision as there will be new information and ideas in order to lessen the occurrence of tainted food which might cause food borne illnesses. Other factors (organizational structure, and procedures, organizational food safety culture, economic factors etc) despite demographic information also influence the understanding, perception, and behaviour of food handlers. It is imperative that those who handle food undergo periodic trainings and awareness on food safety and hygiene to ensure safe food provision in all food restaurants thereby reducing the cases of food borne illnesses.

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

LIST OF ACRONYMS AND ABBREVIATIONS

CDC: Centre of Disease Control

FAO: Food and Agricultural Organization

FSSA: Food and Foods Safety Standards Act

GHP: Good Hygienic Practices

GMP: Good Manufacturing Practices

HACCP: Hazard Analysis Critical Control Point

KAP: Knowledge, Attitude and Practices

MOHCC: Ministry of Health and Child Care

SADC: Southern African Development Community

SSOP: Sanitation Standard Operating Procedure

TPB: Theory of Planned Behaviour

UNICEF: United Nations Children Fund

WHO: World Health Organization

LIST OF APPENDICES

CHAPTER 1: INTRODUCTION

1.1 BACKGROUND OF THE STUDY

Considering numerous scientific researches towards the creation of preventative measures and initiatives for food safety and hygiene, food-borne illness cases continue to be complicated global public health issues (Faour-Klingbeil 2015). Food safety and hygiene have been a long-standing concern in developing countries, where inadequate infrastructure and not having access to potable water and proper hygiene contribute to the spread of food-borne illnesses. Developing countries in Asia and Africa are struggling with food safety and hygiene issues, as evidenced by several outbreaks of illness such as cholera (WHO 2015).

Studies shows that at least 10 people out 100 have access to clean water, with 1 out of 10 people having access to proper sanitation. All countries face different challenges regarding sanitation services in restaurants and public domains. In developed countries, the main challenge is ensuring that existing sanitation systems are maintained and updated to meet the needs and expectations of the growing population (Walker et al., 2017). Upgrading and maintaining sanitation systems is regarded as expensive and time consuming in developing countries. Research indicates that in wealthy nations, the challenge of maintaining and updating sanitation systems is due to lack of financial resources. In some cases, challenges may be not having access to essential sanitation services like handwashing stations and toilets (Hutton et al., 2008). This is due to lack of infrastructure development, for example, water supply and waste management systems including cultural and religious beliefs including poor education and awareness about the importance of good sanitation services (Hogan et al., 2009).

Food hygienic routines like hand washing, utensils, fruits and vegetables, storing food efficiently and keeping food at safe temperatures are the best practices to ensure food safety (Food Standards Agency 2023). Poor food hygiene practices might result in food contamination which occurs in various ways, namely physical, chemical, biological and allergen contamination (Hanson 2022). Foodborne diseases are an end result of food contamination due to improper control program for food safety (Saf et al., 2021). They are mainly as a result of viruses, bacteria, parasites and poisons that could be in the food. Symptoms of food-borne illnesses include mild diarrhoea to vomiting, stomach pains, fever and headache which may result in loss of life.

The topic of food safety has grown in significance for various stakeholders, including government food regulatory agencies, hotel operators, restaurant owners, and academic researchers (Zvenyika 2017; Ncube et al., 2020). The relevant legislation in Zimbabwe, the Food and Foods Standard Act chapter 15:04 and the Public Health Act chapter 15:09, require that all parties involved in the food industry establish, implement, and maintain certain standards and practices. All of these parties have concentrated on developing an approach that may be utilised to not only lower the number of illnesses, not only to protect food workers from contamination but also to ensure that they possess a personal understanding of food safety (Madura 2013). In this study, the researcher used questionnaires to assess food handlers' understanding, attitudes, and behaviours with regard to food safety. Information was gathered from 200 street food sellers, and the outcomes demonstrated a marked ignorance of and disregard for food safety regulations. In conclusion, there was need for more effective training and education on street food vendors in-order to improve food safety practices.

Despite the implementation of the HACCP (Hazard Analysis and Critical Control Points) food safety guidelines, issues with food safety infractions continue to be a persistent concern (Little et al., 2007). Researches in Zimbabwe has disclosed that there have been setbacks in food control operations, encompassing the management of goods sold on the streets by a variety of elements, including insufficient food laws, inadequately equipped food inspectorates, subpar lab facilities, incompetent management, and a lack of coordination amongst government food control organisations (Gadaga et al., 2017), since food borne illnesses of microbial origin are associated with street vended foods. COVID-19 pandemic led to an increased awareness of food safety and hygiene, which has helped to reduce cases of diseases caused by food. For example, the Ministry of Health and Child Care launched a public education campaign on cleanliness and food safety, and street food sellers have been trained on food safety practices. Other studies criticise that unexpected uncertainty was brought about by COVID-19 in the world's food supply systems, impacting not just the demand for food and food services but also the labour markets, input sectors, farm production, food processing, transportation, and logistics (Commercial Farmers Union of Zimbabwe, 2020).

There are a number of solutions to poor sanitation services in-order to reduce and eliminate cases of food-borne illnesses. Improving access to water supply and infrastructure development, such as public-private partnership or providing subsides to the poor is one of the solutions to poor sanitation (WHO 2015). Increased education and awareness on the importance of sanitation and hygiene as well as promotion of low-cost sustainable technologies improves sanitation facilities.

In developing countries, many institutions like the World Bank and the United Nations Children's Fund (UNICEF), are working to increase access to basic sanitation through programs that target specific regions or countries (UNICEF 2017). These include, a combination of solutions such as strengthening local and national governance and institutions, providing access to microfinance and improving solid waste management and disposal systems. The Bill and Mellinda Gates Foundation is also one of the organizations that is working to improve sanitation through its reinvent the toilet challenge. This challenge funds research and development of new sanitation (Gates Foundation 2019).

Recent data shows that food-borne illness cases has been on the rise in developing countries such as Zimbabwe. An estimated three million people from Zimbabwe suffer from diarrhoea annually, with half of these instances being caused by contaminated food or water (WHO 2023). The government of Zimbabwe established a food safety program to strengthen the country's food control system and improve food safety. The program includes, developing and implementing new food safety standards, establishing a national food safety committee, and providing training and education on food safety. The World Health Organization has been working with the government to conduct surveillances and researches on food-borne illnesses. Despite the researches, the costs associated with foodborne illness are significant in Zimbabwe.

The direct costs of treating patients and loss of productivity and economic activity amounts to $0.5 billion per year (WHO 2023). This includes the costs related to health care, lost wages, loss of productivity, and loss of trade opportunities. The economic impact of foodborne illness is especially significant in Zimbabwe and other developing countries. This is due to the fact that the significant portion of the population lives in poverty and are highly vulnerable to the effects of food borne illness.

Previous studies show that an estimation of 600 million people fell sick after consuming tainted food, and 545 000 people pass away per year inclusive of children under the age of 5 (WHO 2022). Zimbabwe had 153 new cases of cholera reported throughout the outbreak, with one recorded fatality during the epidemiological week of July 16, 2023 with 3 583 cases and 79 deaths (WHO 2023). On August 27, 2023, the documented cases were 3894 with 96 deaths. In September, the cholera cases rose to 4 106 cases and 112 deaths (WHO 2023). Other studies show that sustainable food production involves that the food manufacturing processes do not only protect the consumers but the environment at large (Ncube et al., 2020). Systems for managing food safety are crucial as they are designed to detect and control food hazards before,

during and after production. Therefore, this study is going to focus on assessing food handlers' knowledge, practices and attitude towards safe food provision.

1.2 PROBLEM STATEMENT

Although Zimbabwe implemented food safety management procedures, significant illnesses among customers has been observed. Rusape town is one of the growing small towns in Zimbabwe with a total population of 32 064 individuals (World Population Review 2023). It is known for its recreational facilities such as the Rusape Dam, hiking and is mainly associated with agricultural activities surrounding the town (Travel Planner 2020). These factors increase food consumption in outdoor settings including hotels, lodges and individually owned restaurants due to an increase in the inflow of people (tourists and farmers). Restaurant owners tend to focus more on meeting the daily demands of food consumption at the expense of the requirements of food handling standards hence imposing the public at risk of food-borne illnesses. Despite being certified and registered, minimal visual assessments are being done but lack proper documentation and scientific studies on food handling practices. Most premises used by restaurant owners have not been originally designed for food handling (for example, the absence and/ or poor sanitation facilities). Those who handle food have not been trained on guidelines for handling food therefore have little knowledge on food hygiene and safety. The magnitude of the problem can be higher considering that some food borne illnesses or cases of food poisoning go unreported which can be a problem affecting the whole town.

1.3 JUSTIFICATION

Foodborne illnesses are a significant public health issue and restaurant owners play a vital role in preventing them. Restaurant owners have a legal and ethical responsibility to guarantee that their food can be consumed without risk by complying to food safety programmes and statutory instruments regarding food safety (Zvenyika 2017). The government should ensure that all farmers and food handlers including food restaurant owners should be taught the fundamentals of food safety and cleanliness (Hashanuzzaman et al., 2020). Food handlers were discovered to be understudied individuals in food security surveillance carried out in Bindura town (Ncube et al., 2020), therefore this study is going to shed some light on food workers' awareness of food safety procedures in relation to food safety.

Food served at a designated food restaurant or takeaway should not have a negative impact on human health but rather should be nutritious to the consumers. The previous studies indicated that most street food are preheated to serve which alleviate some of food hazards which might

cause food-borne illnesses (Bryan 1997). This is because there are critical points which require temperature measuring devices when heating the food therefore, a safe temperature should be maintained for the meal. In addition, food handlers are the contaminant's source via cross contamination with food and food preparing surfaces, therefore, personal hygiene is required (Ncube et al 2020). Foodborne diseases can have serious consequences such as hospitalization and death. The aim of this study is to assess the understanding, traits, and behaviours of restaurant owners towards food hygiene in order to lower the number of food-borne illness cases.

1.4.0 AIM

To evaluate food handlers' knowledge and practices of Rusape town's small-scale restaurants.

1.4.1 OBJECTIVES

- To determine the food safety and hygiene knowledge, practices and attitudes of food handlers on safe food handling, preparation and serving.
- To define the connection between food safety hygiene and knowledge.

1.4.2 RESEARCH QUESTIONS

1. What knowledge do the food handlers have pertaining to handling food safely during preparation and serving?
2. What is the relationship between knowledge and hygiene practices amongst food handlers?

CHAPTER 2: LITERATURE REVIEW

2.1 THEORETICAL FRAMEWORK

Food safety and hygiene are important issues that can possess a noteworthy effect on public health. It is documented that more than 600 million people became sick and 420000 die every year as a result of foodborne infections (WHO 2021). There are many factors that contribute to food-borne illnesses and these include cross-contamination, presence of harmful substances and improper food handling and storage.

The World Health Organization developed a theoretical framework on food safety that is based on the farm to fork concept. This framework takes into account, the complete process of producing food and supply web, from primary processing to retail and intake (WHO 2023). It is based on the premise that food security is a shared duty to all in the food supply chain, including producers, processors and consumers. This framework, emphasizes on the importance of adopting a hazard-based strategy to food security, which means, focussing on the risks which are most likely to cause illness and taking the required measures to prevent and control the identified risks. There are four basic food safety principles that can help prevent food-borne illnesses (CDC 2022). These include keeping food contact surfaces and utensils clean, keeping processed and unprocessed foods separate, preparing food to a safe temperature and refrigerating or freezing food promptly.

A number of studies have found that education and training are also important factors in promoting food security and preventing infections from contaminated food (Buzby et al., 2016; Fung et al., 2006; Reardon et al., 2006). It was found that a training program for food handlers reduced the incidents of food-borne illnesses by 85% (Fung et al., 2006). The other study found that customers who were given information about safe food handling practices followed those practices than those without the information (Reardon et al., 2006). An analysis was conducted from the Centre of Disease Control (CDC) to identify American health risks for food-borne infections. The researchers found that the people who had received food safety training were less likely to report a food-borne illness compared to those who have not been trained (Bubzy et al., 2016). They also found that the individuals who would have been following food safety practices were also less likely to report a food-borne illness.

According to a study conducted in Zimbabwe, it was found that food-borne diseases are a significant public health dilemma, many consumers lack understanding and awareness to make knowledgeable choices on food safety (Muringai et al., 2016). The researchers used

questionnaires, interviews and survey methods for data collection. They also analysed the relevant policies and regulations pertaining to food safety in the country which include the Nutrition Policy which was developed in 2002 and revised in 2013. The study also indicated that many food handlers have inadequate training, and also lack in the enforcement of food safety standards. The researchers noted that there are some food safety initiatives being implemented in the country and these include the Food Safety and Quality Assurance Unit of the Ministry of Health and Child Care (Muringai et al., 2016).

2.2 THEORY OF PLANNED BEHAVIOUR (TPB)

Utilised is the philosophy of planned behaviour to predict human behaviour and attitude. The act of executing a behaviour is termed as a joint function of intentions and perceived behavioural control. This theory has three factors that are logically independent of intention specifically behaviour attitude, subjective form, and perceived behavioural oversight (Ajzen 1999). The mindset regarding conduct pertains to when a person's assessment or opinion of the actions in question is either positive or negative. Personal opinion is when the perceived public pressure to engage in the conduct or refrain from doing so. Perceived behavioural control pertains to the perceived challenge of executing a behaviour and is presumed to be influenced by prior encounters, such as expected hindrances. The actions that is to be predicted must match or be compatible with the measurements of aim and perceived behavioural control (Ajzen et al., 1977; Ajzen 1988). When the behaviour or situation affords an individual’s complete control over behavioural performance, intentions alone should be used to predict behaviour, according to the theory of reasoned actions.

Previous studies show how many foodborne disease cases are reported over the last 10 years, Australia's population has grown, and in many affluent nations, about 25% of people suffer from foodborne illnesses. The meta-analysis used by Lin et al., (2020), showed that an overall random effect size of the planned behaviour theory constructs, forecast behaviour goals towards food safety with a positive and significant relationship. According to Green et al., (2007), the theory of planned behaviour intervention aimed to raise the kids' fruit and vegetable intake, discovered that trying to alter the behaviour by formulating implementation intents to support behaviour planning, led to an increase in the intake of fruits and vegetables. However, intentions are only translated to actions by approximately 50%.

2.3 KNOWLEDGE, ATTITUDE AND PRACTICES (KAP) MODEL

This concept is the best theory used to elucidate and research food safety standards (Zanin et al., 2017). The theory was drafted in the 1950s and is frequently employed to investigate the mental elements of handling food. It supposes that food handlers will implement good food safety procedures if they possess the necessary information and have a favourable outlook on food safety (Bas et al., 2006). Food handlers with favourable perspectives on food safety and cleanliness are based on sufficient food safety understanding, commendable food safety behaviours, like maintaining personal cleanliness, cleaning of utensils, safe storage of raw and finished food products etc (Kwol 2020). The KAP model also have its own limitations since the application of the theory to a study is based on theoretical rationale and practice scaling, scoring, and evaluating (Cunha et al., 2022).

Previous studies show that, in applying the KAP concept, knowledge can promote an optimistic outlook, and that outlook in turn will shape good hygienic practices (Ahmed et al., 2021). Other researchers criticise the notion since it appears that knowledge is not enough to anticipate attitudes and behaviours (Zanin et al., 2017).

2.3.1 KNOWLEDGE, ATTITUDE AND PRACTICES OF FOOD HANDLERS

An investigation on the link between two distinct forms of food company management and the knowledge, attitudes, and behaviours of food handlers about food safety was conducted in Beirut, Lebanon (Faour-Klingbeil 2015). The researcher used questionnaires consisting of two sections namely the demographic data with information about each food handler, including their gender, age, education, experience at work, and training in food safety. There were two closed questions and seventeen multiple-choice questions in this section to evaluate food handler’s understanding on food contamination, sanitation, personal hygiene, and temperature regulation. For sections 3 and 4, there were ratings on how frequently safe handling techniques are used such as hand washing and surface cleaning, and the respondents' beliefs using a Likert scale.

The researcher discovered that respondents' common misconceptions and inadequate knowledge are in significant fields of food safety which are regulation of temperature and concerns about cross-contamination (Faour-Klingbeil 2015). Respondents had excellent attitudes in every way, but they failed to put them into action. The self-reported behaviours and the management style were highly correlated, for example, the culinary enterprises run by owners or lone proprietors, the manager or the chef is still in charge of the operational tasks. They were found to lack

interest in food safety issues, hence food safety is dependent on human behaviour and different external factors such as cultural and social background (Faour-Klingbeil 2015).

A study on the understanding, depositions and practices in boarding school including eateries food service employees' compliance with the fundamental precondition programmes of the food safety procedures was done in Masvingo, Zimbabwe (Zvenyika 2017). The objectives of the study were to ascertain the sociodemographic traits of food service personnel and their familiarity with the fundamental training courses of food safety procedures, the perceptions on prerequisite programmes of food service personnel and restaurant food service personnel's basic precondition programmes of food security control systems and boarding schools in Masvingo Province, Zimbabwe.

The researcher used a sampling design of the boarding schools in Masvingo Province and picked up 17 boarding schools. The desired confidence level of the sample size calculation was set at 95% and the design effect at 1. For data collection, the researcher used questionnaires and observatory checklists with socio-demographic, safe food preparation, storage and serving questions. Given that 95.7% of the food service employees in Masvingo Province had completed secondary school, they exhibited high levels of literacy. In contrast, the food handlers' level of education was not well-suited for their job responsibilities, as they had not received specialized training focused on food safety issues. Additionally, there was a general lack of regard with relevant food safety legislation and regulations among these workers (Zvenyika 2017).

According to a study conducted in Bindura town on food handlers at a lower-middle-class restaurant's knowledge, perceptions, and procedures regarding food safety. The objective of the study was to assess the correlation among food safety understanding, practices including work experience (Ncube et al., 2020). Purposively chosen from 22 commercial restaurants, a total of 101 food handlers involved in food preparation, serving, and sales. The researchers used questionnaires which were mainly based on the HACCP principles and an observation checklist in food restaurants with food handlers amounting to 101 both male and female. Food handlers' self-reported work habits, attitudes, and knowledge about food safety were all intended to be evaluated by a questionnaire. It was created in English, translated into the local language (Chi Shona), administered there, and then retranslated back into English for reporting and data analysis.

The results showed the significant positive relationship amongst food handlers' attitudes, habits, and understanding regarding food safety (Ncube 2020). Therefore, food security training programmes should continue being conducted to correct the undesirable food hygiene behaviour. This emphasises how important it is to focus on enhancing food handlers' knowledge and attitudes about food safety through initiatives like offering simple and comprehensive food security education programmes, in order to increase the adoption of safe food handling procedures. In conclusion, safe food education initiatives ought to concentrate on rectifying unfavourable behaviours including snorting and coughing over food, using dirty hands, utensils, and work surfaces, and not properly thawing and refreezing food (Ncube et al., 2020).

A study on employees in the food business who violate food safety was carried out in Zimbabwe (Makwanda et al., 2014). The goal was to identify if those who handle food in the food sector are aware of food safety protocols and the consequences of breaking them. In order to determine the causes and degree of awareness of food security offences by those working in the food business, the research methodology of the study employed a survey strategy. The food processors from hotels, quick food restaurants, and takeout were the study's target group.

Results showed that food handlers had some knowledge on food safety procedures but continued compromising food safety. The results of this investigation supported the assertions by other researchers that food handlers are not well-versed in the measures that should be taken to prevent violations of food safety (Little et al., (2007). This study also showed that the only approach to lower food safety violations in restaurants is to provide sufficient resources and train food workers (Makwanda et al., 2014).

An evaluation of the knowledge, attitudes, and practices related to food safety among fishermen and restaurant food handlers was conducted in Bangladesh (Hashanuzzaman et al., 2020). The aim of the research was to analyse the relationship between the understanding, depositions and behaviour towards food safety and hygiene amongst farmers and restaurants. The researcher used questionnaires which had two segments namely the sociodemographic factors, such as income level, sex, occupation, and age. The second section of the questionnaire contained questions about knowledge, attitudes, and practices. It also featured a scoring system for KAP (Knowledge, Attitudes, Practices) and the relationships between the three domains in restaurants and farms. A rating scale with the options agree, disagree, and uncertain was used to gauge each participant's degree of agreement with their remarks. A participant's response was scored on a

scale of 0 to 2, with 2 points awarded for a correct response and 1 point for an uncertain or incorrect response, respectively.

According to the study, the respondents expressed agreement that cleanliness practices needed to be trained on and expressed interest in attending in their own time. While a few food handlers believed that raw and prepared meals should be kept apart, others thought incorrect food preservation was unhealthy. The respondents agreed that when handling and serving unwrapped food, using masks and protective apparel is also essential in safe food practices (Hashanuzzaman et al., 2020). For fishermen and food handlers, a noteworthy and robust association was discovered between knowledge and attitudes, knowledge and practices, and attitudes and practices, ranging from 0.73 to 0.99 across the three domains.

2.4 FOOD SAFETY LEGAL FRAMEWORK

The Southern African Development Community (SADC) and the World Health Organisation (WHO) and the Food and Agricultural Organization (FAO), have been promoting food safety in Zimbabwe. The WHO has the Codex Alimentarius, which is a set of accepted worldwide norms and recommendations including codes of practice for food safety (WHO 2022). The key provisions of the Codex Alimentarius include the principles of food standards, which provides guidance on how to prevent contamination. It also provides guidelines on the use of microbiological criteria of food, which provides recommendations on how to use microbial testing to ensure food safety.

SADC has the Regional Food Safety Policy, which aims to harmonize food safety standards across the region. The policy aims to promote safe and nutritious food, protect public health and ensure the fair operation of the food trade across Southern Africa. It also ensures that food safety standards comply with international standards such as the Codex Alimentarius (SADC 2012). The key provisions of the policy include that it sets out the rules of food security, including the importance of consumer protection, risk assessment and transparency. Another provision is that it outlines the duties of each individual in the food web, including producers, processors, retailers and consumers. It also establishes a framework for food safety cooperating and coordination among SADC member states, including information sharing, capacity building and technical assistance. The policy also sets out the framework for monitoring, surveillance, and enforcement of food safety standards (SADC 2012).

Food safety is regulated by the Food and Foods Standards Act (FSSA) 15:04, which was established in 2011 in Zimbabwe. The FSSA is administered by the Ministry of Health and Child Care (MOHCC), and it covers issues to do with food safety, which includes processing, handling, conserving and sale of food. The Act also makes provisions in favour of creating a national food regulation system, which is responsible for monitoring and enforcing food safety laws. Zimbabwe has also ratified a number of international conventions and treaties on food safety and these include the WHO Codex Alimentarius. The country also developed a number of regulations and guidelines on specific aspects of food safety such as Hazard Analysis Critical Control Points (HACCP), Good Manufacturing Practices (GMP), and Good Hygiene Practices (GHP). These regulations and guidelines provide more detailed information on how food should be produced, processed and handles to ensure safety.

2.5 FOOD SAFETY AND HYGIENE

Researchers show that food contamination occurs during the production of raw materials, transport of unprocessed components, food production, food packaging, food storing and distribution and transport of packaged food (Cruz et al., 2006). Food contaminants which bring adverse health effects include biological, chemical, physical agents and /or the condition of the food (Codex 1997). Food hazards or contaminants may come along the food supply chain can be prevented by Good Manufacturing Practices (GMP), Sanitation standard operating procedure, good hygiene practices and Hazard Analysis of Critical Control Points (HACCP) (Cruz et al., 2006).

A study on the status of the food control system in Zimbabwe (Pswarayi et al., 2014), assessed the strengths of the current food control regulations as well as the challenges being faced by Zimbabwe to implement the food systems. According to the authors, poor coordination, a lack of expertise, and outdated laws that do not take into account modern practices and technological advancements define Zimbabwe's food control and administrative system. Based on the data acquired for the research, Zimbabwe's food policy and regulatory framework has not undergone any noticeable modifications since 2005. Nonetheless, the creation of the Food Control Bill of 2011, which aims to create the Food Control Authority of Zimbabwe, has brought about some headway in resolving these issues.

2.5.1 GOOD MANUFACTURING PRACTICES (GMP)

GMP is a method which existed since 1970 and was formalised in several nations in the middle of the 1990s. GMP refers to actions which are applied to food production in reference to four

points namely excluding, eliminating undesired and external materials, inhibiting, and eliminating undesired microbes (Wilna et al., (2016). GMP have its important keys in food safety and hygiene. These include better quality of food, decreased consumer complaints, employee motivation and productivity and promote a safer working environment (Cruz et al., 2006). An assessment of the risks related to storing and warming food at vending locations in a little town in Zambia (Bryan et al., 1996), assessed the preparation and reheating of vended food. The researcher used observations, temporal temperature measurements, and interpretations of the findings of laboratory testing on food samples (including leftovers) gathered after preservation and reheating. Most of the food stuffs contained bacteria such as salmonellae and bacillus cereus. These bacteria contribute to food-borne diseases such as diarrhoea.

The researcher observed that there was contamination from inadequately cleaned serving implements which could have contributed to food safety issues. Some of the leftover food had coliform bacteria and E. coli, which are signs of contamination from post-heating. Prevention measures of food-borne illnesses which were recommended by the authors included, killing of bacteria and prohibiting them from getting into the cooked food, warming up cooked food before it gets contaminated after cooking and before hazards can develop or multiply, and keeping food at a temperature higher than where bacteria can grow (Bryan et al., 1996).

2.5.2 SANITATION STANDARD OPERATING PROCEDURE (SSOP)

Sanitation Standard Operating Procedures (SSOPs) are written protocols that are developed and put into practice within a food facility (Wilna et al., 2016). The purpose of SSOPs is to keep utensils, equipment, and other food contact surfaces free from pathogenic (disease-causing) microorganisms, as well as to minimize the presence of spoilage microbiota (Cruz et al., 2006). The establishment must keep records of the procedures and must be available to regulatory authorities and the government upon request.

A comprehensive study was conducted on food safety and sanitation (Djukic et al., 2016). The researcher highlighted that food hygiene is a fundamental SSOPs are an essential component in all food manufacturing facilities and operations. Poor sanitation facilities due to lack of sanitation procedures attract micro-organisms which can cause cross-contamination hence coming into contact with food. This will become a major risk as this may lead to food spoilage, causing food-borne diseases. An effective sanitation programme needs to be implemented as a component of food safety norms and involves the workers collaborating to meet client expectation. Good hygiene practices begin from the entrance, that is the parking lot right into the

plant (Djukic et al., 2016). The authors also highlighted that the entrance's, ablutions and changing areas should be established in the mindset of all employees and to management.

2.5.3 GOOD HYGIENE PRACTICES (GHP)

The actions and methods carried out using best practice guidelines are known as good hygiene practices. Feglo et al., (2004), show that advised monitoring and instruction of the desirable designs of infrastructure and utilities to food business can ages to ensue. However, Felgo et al., (2012), highlighted that hygiene training of food handlers in food industries reduces the occurrence of foodborne illnesses. Cunha et al., (2015) also mentioned that due to increased stress and anxiety, there were lower knowledge ratings on food safety-related topics amongst food handlers who did not take part in food safety courses, indicating that such courses can enhance comprehension of food safety and cleanliness.

In Mbare Musika (Harare), a study was conducted on microbiological safety of cooked and prepared food items sold in an informal urban market setting (Kwiri et al., 2014). The study aimed to analyse the presence of microbes in vended foods. The study was conducted in the largest national bus terminal located in a major metropolitan area of Zimbabwe. This bus terminal serves as the primary national marketplace and a key entry point for agricultural goods being brought into the national and regional market.

In summary, the unacceptably high levels of bacterial contamination, specifically with E. coli, found in most of the street-vended foods highlighted the potential health risks associated with these informally sold food items. The study's findings demonstrated that some of the cooked food products being sold on the streets of the Mbare-Msika area of Harare fail to meet the required standards for food quality and safety (Kwiri et al., 2014). As a result, it is extremely important to prioritize the microbiological safety and overall quality of street food products. This can be achieved through the development of customized Good Manufacturing Practices (GMP) and Good Hygiene Practices (GHP) guidelines specifically for street food vendors. Additionally, awareness and training programs should be implemented to educate these informal food businesses on proper food safety standards.

2.5.4 HAZARD ANALYSIS OF CRITICAL CONTROL POINTS (HACCP)

Studies focussing on HACCP show that the framework is applicable across the whole food supply network. The results of the implementation of HACCP at a food business results in improvements on food security, improved utilisation of resources, and prompt resolution of food safety issues (Wilna et al., 2016). However, according to FAO (1997), the Hazard Analysis and

Critical Control Points (HACCP) approach is compatible with and can be integrated alongside other established food quality management systems, such as the ISO 9000 series, standards developed by the International Organization for Standardization. HACCP can be seamlessly implemented in conjunction with these other quality assurance frameworks.

A study on food safety and quality was conducted to conclude the origins and food-borne illness dissemination and their impacts (Wilna et al., 2016). The goals of the research were to describe the various types of food-borne diseases, their causes and extent and ways to keep food safe for intake. Food-borne diseases are transmitted through viruses and poor hygiene are also regarded as hazards for food-borne illnesses (Rolando 2011). In food contamination, pathogens grow on food before intake and generate poisons which may cause diseases. All nations need to increase their capabilities for safeguarding food, especially developing countries with inadequate resources (Wilna et al., 2016).

The methodology used on domestic food preparation and the food prepared by vendors was assessment of the 5 strategies to promote international food safety which were outlined by WHO. These include maintain things tidy, keep cooked and raw foods apart, and prepare meals fully including when reheating, employ safe water and maintain food at appropriate temperatures. The researcher used the HACCP method to identify the critical control points of food hazards. Compliance to food systems and international food safety standards are lacking in most food restaurants in developing countries (Wilna 2016). They often face challenges of poor sanitation, change in food take habits, state agencies' poor coordination, as well as problems with food safety and sustainability.

2.6 CHALLENGES AND SOLUTIONS TO FOOD SAFETY AND HYGIENE

Previous studies show that, when small businesses are constantly being established, a significant number of them unfortunately do not succeed, due to facing a variety of challenges. In a study carried out in Zimbabwe's factories (Matsongoni et al., 2021), it was found that small-to-medium enterprise (SME) owners face significant challenges in implementing food safety and hygienic practices. Some of the most prevalent challenges faced by small businesses include the high cost of obtaining credit, information asymmetry between businesses and financial institutions, issues with establishing creditworthiness, and the complex lending procedures imposed by financial institutions. According to a study conducted in Harare Province (Macheka et al., 2013), the obstacles in enforcing systems of food safety in Zimbabwe is limited financial resources, size of the business, inadequate amenities and structures, as well as the absence of support from higher-

ups. Some of the challenges faced are within the organisation which include, level of knowledge on food safety and hygiene or resource availability. Most of the food restaurant owners or business managers tend to keep their operations non-official as they believe that consulting food technologists or scientists is more expensive (Chiwara 2020). They also have little knowledge on the regulation institutions such as Standards Association of Zimbabwe (SAZ), thus have no idea of the laws and legal requirements governing the premises of food companies.

Implementing a food safety management system offers numerous benefits for small and medium-sized enterprises (SMEs). It provides a structured framework to support their decision-making, increase due diligence, and streamline operations. By consolidating overlapping audits, SMEs can save valuable resources. Additionally, these systems enable more efficient and responsive control of food safety hazards through systematic management of prerequisite programs and improved documentation practices. This leads to better planning, reduced post-process verifications, and overall enhanced food safety and quality assurance across the business (Kajongwe et al., 2021). It is recommended that small and medium-sized manufacturing businesses in Zimbabwe continually strive to expand their capacity, optimize their operations, upgrade their machinery, invest in their human resources, and strengthen their capital base. Enhancing these different facets of the enterprise has a direct impact on the effectiveness and robustness of their food safety management systems (Kajongwe et al.., 2021).

The state ought to generate initiatives to increase awareness on how food safety procedures can help SMEs operate better and provide higher-quality work. This can be done through seminars and classes, as well as receive funding without the need for significant collateral. Developing, fostering, and strengthening a suitable institutional structure with a particular focus on assisting small and medium-sized businesses should be the cornerstones of any efforts to improve SME skills. It is important to develop national-level standards that specifically promote the use of food safety management systems as a driver for socio-economic development. At the same time, the various players and stakeholders within the food manufacturing industries should focus on understanding both the benefits and challenges associated with implementing these food safety management frameworks (Kajongwe et al., 2021). Previous studies show that the government should give a favourable market place for SMEs by enforcing regulations that promotions the effectiveness of SMEs using systems to monitor food safety (Ncube et al., 2020).

The key determinants of this study include the infrastructure, that is the availability and quality of infrastructure, such as water supply and sanitation facilities (Egan et al., 2017). The

researchers found that limited clean water and adequate sanitation facilities correspond with an increased risk in diarrhoea in rural areas of Zimbabwe. Poor sanitation and hygienic practices, such as inadequate handwashing facilities, are major contributors to the occurrence of diarrhoea among school children in the urban areas of Zimbabwe. The existence and enforcement of food safety legislation promote food security. In the informal sector, it was found that lack of law enforcement on food safety promote many cases of food-borne illnesses in Zimbabwe (Kafuti et al., 2014).

CHAPTER 3: MATERIALS AND METHODOLOGY

3.1 AREA OF STUDY

A longitudinal investigation was carried out in Rusape town (18. 535252 S, 32. 134865 E) between January and April 2024. Rusape town is situated in the Manicaland Province, Makoni District in northeastern Zimbabwe. The town roughly lies 170 kilometres, by road, South-East of Harare, the capital city of Zimbabwe. Twenty-five (25) food handlers were engaged in the handling, cooking food and service from 9 registered eateries. Approximately 33% of the eateries were modest size-wise and provided food as much as 60 meals daily and the remaining restaurants served to above 100 meals. Although the preparation and supply of risk fast foods such as fried chips, fried chicken, eggs, salads and rice, only 27% of the restaurants had a HACCP and also certified to a food safety standard (ISO 22000). Data were collected using questionnaire.

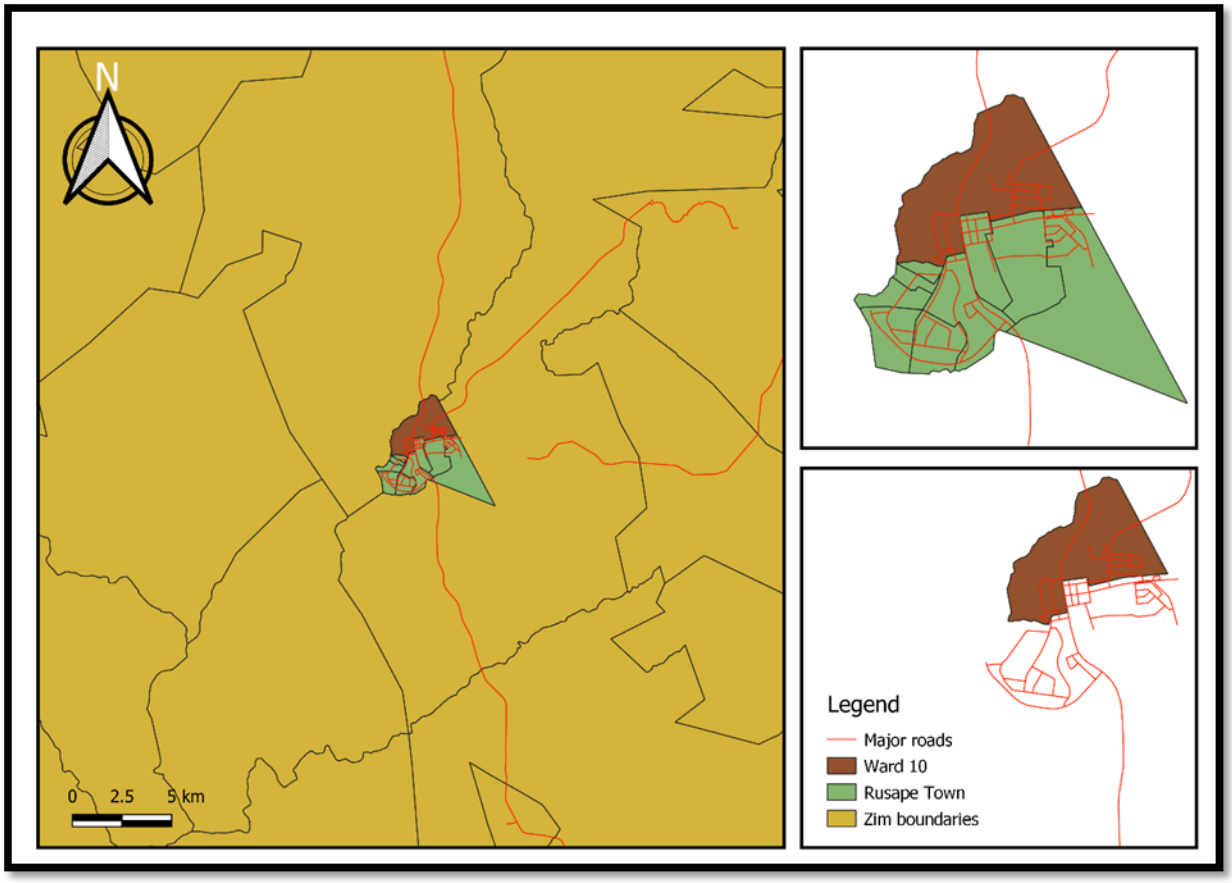


Fig 3.1: Location of area under study

3.2 TARGET POPULATION AND SAMPLE SIZE

The study targeted Rusape Town Restaurant owners and food handlers including those who work in offices and those who operate directly with the food during preparation and serving. There are eighteen (18) registered food restaurants are in Rusape town, most of them are in the central business district (CBD). The study population was randomly picked out from the eighteen (18) registered food restaurants using simple random sampling. This assumption was made according to the presumption that above 50% of the intended audience is knowledgeable, has a positive outlook, and follows best practices including compliance to the laws and regulation of food hygiene and safety.

3.2.1 STRATEGY FOR SAMPLING

Stratified sampling method was used as a selection criterion for participants. The registered food restaurants in Rusape Town were divided into subgroups (strata). Using simple random sampling method, 9 restaurants were picked out to be representative sample of the targeted restaurants. Simple random sampling was also used as a criterion to select food handlers from each of the picked registered food restaurants, to ensure a fair presentation of the population under study.

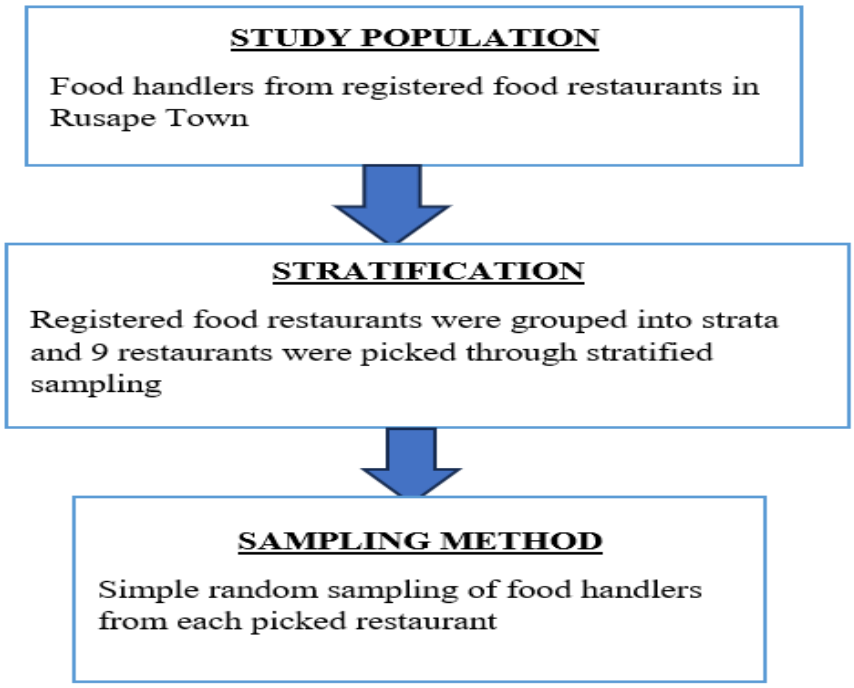


Figure 3.2 Sample selection criteria

3.3 METHODOLOGY

3.3.1 QUESTIONNAIRES

A methodical survey was created utilising the guidelines of HACCP and food safety demands of food safety regulations in Zimbabwe (Ncube et al., 2020). The purpose of this survey intended to evaluate food handlers' beliefs, behaviours, and competence. The questionnaire was designed in English language and was presented to the food handlers in the local language (Shona). This was done to ensure good understanding of the questions to ensure accurate responses from the respondents. The questionnaires were firstly handed out to the Environmental Health Officers of Rusape Town Council (RTC), for further revision and corrections before giving them to the food handlers.

Each questionnaire had 4 sections with both closed and open-ended questions. The first one being on socio-demographic information such as degree of education, number of years of working experience and the occupation. The next section had 7 questions on safety attitude. These included questions on food safety education, hygiene, supervision and roles towards prevention of food spoilage. The third section consisted of 6 questions on safety knowledge, with questions on food spoilage, food contamination and personal hygiene. The fourth part of the

questionnaire had 7 questions on safety practices such as personal hygiene (washing of hands, clean working personal protective equipment or uniforms), use of safe clean water and washing of raw materials (vegetables) including utensils.

3.3.2 RELIABILITY AND VALIDITY OF DATA

In this study validity of the data was addressed by the inclusion of only registered food restaurants in the sample, who were expected to be complying with the regulations of food safety and hygiene. This is because operating licences are granted to companies which meet the fundamental standards for food safety. The precision of the information capturing tool was examined using pilot study in a comparable research group, consisting of a single manager, two cleaners including two cooks in another town apart from Rusape Town. Adjustments were carried out on some of the questions which were deemed not fit for the study.

Systematic prejudice or inaccuracy was addressed through basic sampling of participants to guarantee representation of the target population. Although, the closed-ended questions in the questionnaire used for this study helped in gathering efficient information, they also act as a limitation to the respondents. However, bias was reduced through the training sessions which were conducted before the food handlers answer their questionnaires.

3.3.3 ETHICAL CONSIDERATIONS

Ethical approval of the study was granted by Rusape Town Council in March 2024, such that the data captured is only applied for academic purposes. To ensure confidentiality of the personal information of respondents (such as name, home address and/ or date of birth), there were no questions referring to these in the questionnaire and, respondents were instructed not to put their personal details on the questionnaire. This was done to gain confident in the answers from the food handlers since they were sure that their answers were not to be presented to the top management. A 15-minute training was carried out to the food handlers on how they were going to answer the questionnaire. With regards to the principle of nonmaleficence to respondents, it was made explicit to the people handling food that no harm is going to come to them during the process of data collection since their information is to be kept private and confidential.

3.4 STATISTICAL ANALYSIS

Analysis was performed with the Statistical Programme for Social Sciences (SPSS) version 20. This programme was used for the quantitative analysis of data collected through the questionnaire. The data was tested for normality prior to analysis and the sum of the frequency distributions were done and represented as mean ± standard deviation. Using statistical methods,

the food handler' knowledge and attitudes on food security were summed together (mean ± standard deviation). An analysis of variance (ANOVA) was performed in one way to determine the relationship between the variables under study at 5% (0.05) significance level.

CHAPTER FOUR: RESULTS

4.1 SOCIO-DEMOGRAPHIC INFORMATION OF PARTICIPANTS

		Percentage (%)
1. Highest Educational Level	Illiterate	12
	Primary	8
	Secondary	40
	Tertiary	40
2. Occupation	Cleaner	20
	Cook	28
	Waiter/waitress	20
	Supervisor/ Manager	32
3. Years of work Experience	Below 1 year	40
	1-5 years	48
	5-10 years	12

Table 1 Socio-demographic information of participants.

Table 4.1 shows the demographic information of food handlers' who work in registered food restaurants of Rusape Town.

The study managed to interview 25 individuals from different restaurants through a questionnaire. Most of those surveyed had the greatest score on educational level of secondary 40% and tertiary 48%, with 12% illiterate individuals and 8% individuals having their highest educational level at primary level. The dominant occupational positions of the respondents were supervisors/ managers 32% followed by cook 28% whilst cleaner and waiters/ waitresses having an average of 20%. For the years of experience, 48% of the respondents were between 1-5 years whilst 40% were below 1 year and 12% were between 5-10 years. As evidenced by the high educational level of food handlers being at secondary and tertiary, it implies that more food handlers under study understand food safety and hygiene, more-so, this gives a positive effect on their attitudes and practices during food preparation.

4.2 FOOD SAFETY AND HYGIENE KNOWLEDGE OF FOOD HANDLERS ON SAFE FOOD HANDLING, PREPARATION AND SERVING.

Knowledge	Characteristics	Percentage (%)
Cleaning or sanitizing of kitchen tools reduces the occurrence of food spoilage?	Agree	96
	Disagree	0
	Don't Know	4
Reheating of cooked foods contribute to food-borne illness?	Agree	24
	Disagree	40
	Don't Know	36
When chefs or people who share cooking equipment spread bacteria from tainted food, this is known as cross-contamination.	Agree	72
	Disagree	8
	Don't Know	20
Should there be running safe water at the food premise?	Agree	96
	Disagree	4
	Don't Know	0

Table 2 Knowledge on Food Safety

Table 4.2 shows the food handlers on knowledge of food safety.

A majority of respondents have knowledge on food safety and hygiene as 96% knew that cleaning kitchen equipment alter the hazard of food spoilage whilst 72% had knowledge that cross-contamination is the spread of microbes from tainted food by food handlers or sharing cooking tools. These results are affected by the socio-demographic information of the food handlers under study (highest educational level) as some individuals are illiterate ($p > 0.05$ and $f < 1$). This can have a negative influence on food safety since it implies that they lack awareness of food safety and cleanliness. As evidenced by the results, most food handlers disagree and have lack of insight that warming food might increase the risk of food-borne diseases.

4.3 FOOD SAFETY AND HYGIENE ATTITUDE OF FOOD HANDLERS ON SAFE FOOD HANDLING, PREPARATION AND SERVING.

Attitude	Characteristics	Percentage (%)
The most important part of my job is safe food provision.	Yes	100
	No	0
A food handler cannot perform their duties when they have abrasions or cuts without wearing gloves.	Yes	76
	No	24
It is not required to thoroughly wash veggies and fruits underneath running water in order to avoid food poisoning.	Yes	28
	No	72
Medical examinations for food handlers shall be conducted in every six months.	Yes	80
	No	20

Table 3 Food Safety Perceptions

Table 4.3 represents the food handlers' responses on food safety attitude.

The table show that most respondents have a positive attitude regarding food security and cleanliness as 100% respondents agreed that their goal in business is safe food provision and 80% indicating that medical examinations should be conducted in every six months. These

results are not influenced by the food handlers' demographic data ($p>0.05$ and $f<1$) but can be influenced by the organisational policies and procedures. Despite being provided with gloves, some food handlers are ignorant meaning that they might choose to perform their duties not knowing that they might endanger the health of the consumers as shown by 24% of food handlers opining that it is possible for a food handler to perform duties without gloves despite having abrasions and cuts.

4.4 FOOD SAFETY AND HYGIENE PRACTICES OF FOOD HANDLERS ON FOOD PREPARATION AND SERVING.

Practices	Characteristics	Percentage (%)
What do you use when drying your hands	Air Drier	44
	Communal Towel	44
	Frisk Drying	12
	Others……	
State of finger nails?	Short and dirty	0
	Long and dirty	0
	Long and clean	4
	Short and clean	96
Have you been trained on food safety in the last 12 months?	Yes	52
	No	48
Do you receive on the job induction before starting work?	Yes	88
	No	12
Do you have the following habits?	Talking over food	4
	Smoking whilst handling food	56
	Sneezing over food	0
	Smelling foods	0
	None	40

Table 4 Food Safety Practices

Table 4.4 shows hygiene practices of food handlers in Rusape Town

The table demonstrate that most of the participants have good hygienic behaviour as over 80% of the food handlers receive training and are taken for job inductions before work, but rather a significant number have undesirable habits during food preparation and serving (60%) as bacteria can be carried from the food handler to the kitchen surfaces which come in contact with kitchen utensils. Results show that an average number food handlers use appropriate method for hand drying as over 50% use air driers and communal towels. Food handlers' safety and hygiene protocols is not affected by the socio-demographic information ($p>0.05$ and $f<1$).

Table 4.5 Level of significance (5%) for years of work experience as a measure of food handlers' knowledge, attitudes, and practices.

ANOVA TABLE

		Sum of squares	df	Mean Square	F	Sig.
Cross-contamination is the transferring of micro-organisms	Between Groups	1.173	2	.587	.857	.438
	Within Groups	15.067	22	.685		
	Total	16.240	24			
Washing of fruits and vegetables is not necessary	Between Groups	.107	2	.053	.238	.790
	Within Groups	4.933	22	.224		
	Total	5.040	24			

following habits	Between Groups	1.057	2	.528	.727	.495
	Within Groups	15.983	22	.727		
	Total	17.040	24			

CHAPTER FIVE: DISCUSSION

5.0 INTRODUCTION

In this section, the explanation of the outcomes is given in detail. The results obtained from the study is compared with findings from other studies which were previously conducted.

5.1 KNOWLEDGE, ATTITUDES PRACTICES OF FOOD HANDLERS ON FOOD SAFETY AND HYGIENE

The study showed that awareness on food hygiene and safety was influenced by the socio-demographic details of the respondents as the responses of the food handlers opined that they had knowledge on cross-contamination and the necessity of cleaning kitchen utensils to alter the risk of contamination. This is similar to the findings of the research conducted by Abdelhafez (2013) who found out that workers with high educational level had better knowledge and practices as compared to the other groups. According to Hertzman et al., (2013), as the degree of experience increases, good hygienic and food safety behaviour improve as there will be continuous assessment on various causes of food contamination which might lead to food borne illnesses through food safety trainings and awareness. In contrast, Ncube et al (2020) found that

the demographic information of people who handle food does not influence their knowledge, perception and practices during food preparation and serving. More-so, more years of experience might result in an individual becoming ignorant to certain issues to do with safe food provision in food restaurants which will result in more cases of illnesses.

The first objective was to evaluate the understanding, attitude and behaviour of respondents towards safe food provision. The results show that hygiene practices are mostly affected by food safety training since a significant number of individuals agreed that reheating of food does not contribute to food borne illness, washing of fruits and vegetables is not necessary and having undesirable habits during food preparation (talking over food, smelling food). These results agree to the results of Nyawo et al., (2021) which showed that most food handlers use their knowledge from home regarding safe food provision due to lack of basic food security training. Training is important in improving the knowledge and behaviour of food handlers allowing for secure food provision. These include the washing and drying of hands with appropriate methods, cleaning of kitchen utensils as well as basic knowledge on cross-contamination, thereby preventing it from occurring.

The second objective results show that hygiene habits and understanding of food safety are strongly correlated. Food safety knowledge influence food handler's perception and practice towards food safety and hygiene. Food safety understanding has an effect on the perceptions of food handlers towards safe food provision as evidenced by most of individuals agreeing that vegetables and fruits should be washed to remove pathogens. Nadhifah et al., (2021) suggests that there is a notable correlation between one's level of knowledge and their corresponding attitudes or perspectives on a given topic in regards to food handling practices. These results also tally with the findings of Saf (2021) who opined that there is a strong correlation connecting mindset and education of food handler, but a contradiction as he found that there is no significant relationship between education and hygienic behaviour.

However, despite the demographic information (occupation, highest educational level, years of work experience) having effects on the competence, attitude and behaviour of food handlers, the research showed that there are other external factors which affects safe food provision in registered food restaurants. Most of the food handlers confided into using communal towels as a method of hand drying since they are mostly cheap to purchase. This may be due to a lack of funds from the organization or ignorance from the managers. These factors affect safe food provision as cross contamination of bacteria from the communal towels to the hands and food

causes food poisoning which lead to food borne illnesses (Kouadri 2020). In addition, issues to do with poor law enforcement and/or corruption amongst the regulatory authorities who conduct inspections allows for the restaurant owners to by-pass periodic medicals for food handlers and trainings which affects the knowledge and practices of food handlers for safe food provision (Young et al., 2019).

CHAPTER SIX: CONCLUSION AND RECOMMENDATIONS

6.0 INTRODUCTION

A summary of the study findings is provided in this section, giving a brief overview of the study details and results. The recommendations for the future studies to be conducted are also given in this chapter.

6.1 CONCLUSION

The study shows that socio-demographic information can influence the intelligence, attitude and customs of food handlers towards food sanitation and cleanliness. This is because years of work experience results in a continuous assessment and awareness on food safety which has knowledge enhancements and good hygienic practices. Education on food safety and tidiness also influence an individual's perception and practices in safe food provision as there will be new information and ideas to limit food spoilage which might cause food-based illnesses. Other factors (organizational structure, and procedures, organizational food safety culture, economic factors etc) despite demographic information also influence the knowledge, perception and traditions of food handlers. As a conclusion, there is a robustly favourable link between knowledge and food safety attitude and practices in food preparation and serving. It is important

for food handlers to undergo periodic trainings and awareness on food safety and hygiene to ensure secure food provision in all food restaurants.

6.2 RECOMMENDATIONS

From the results of the study, it can be recommended that;

- ✓ Compliance-based authorities should conduct regular awareness campaigns regarding the trends and new information on food safety and hygiene.
- ✓ Regulatory authorities should periodically check to make sure every worker handling food conduct good hygienic practice and are provided with personal protective equipment (PPE, aprons, gloves, head gear, safety shoes) at their workplaces.
- ✓ Upcoming researches on food safety and hygiene will need to focus on years of work experience as a factor which affects safe food provision in registered food restaurants.

REFERENCES

Abdelhafez, A. M. (2013). Knowledge, attitudes, and practices of food service staff about food hygiene in hospitals in Makkah area, Saudi Arabia. *Life Science Journal*, *10*(3), 1079–1085

Ahmed M.H., Akbar A & Sadiq B. H. (2021) Cross sectional study on food safety knowledge, attitude and practices of food handlers in Lahore District Pakistan.

Ajzen I & Fishbein M. (1977) Attitude-behaviour relations: Atheoretical analysis ad review of empirical research

Ajzen I. (1988) Attitudes, personality and behaviour.

Ajzen I. (1999) The Theory of Planned Behaviour.

Aquino A V H., Lacap G P J & Flores M. (2021) Food safety knowledge, attitude, practices and training of fast-food restaurant food handlers: a moderate analysis.

Bas M., Ersun S. A & Kivanc G. (2006) The evaluation of food hygiene knowledge, attitude and practices of food handlers in food business in Turkey.

Bauza V, Scla D. G., Bisoyi A., Mojorin F., Ghugey A & Clasen T. (2021) Water, Sanitation, and Hygiene Practices and Challenges during the COVID-19 Pandemic: A Cross-Sectional Study in Rural Odisha, India.

Azanaw J., Dagne H., Andualem Z & Adane T. (2021) Food Safety Knowledge, Attitude, and Practice of College Students, Ethopia, 2019: A cross-sectional study.

Bryan F. L, Jermini. M, Schmitt. R, Chilufya E. N, Michael. M, Matoba. A , Mfume. E & Chffiiya .H. (1997) Hazards Associated with Holding and Reheating Foods at Vending Sites in a Small Town in Zambia

Bubzy. J. C., Wells. E. R & Roberts. T. A. (2016) Foodborne illness: past, present, and future. Journal of Food Protection.

CDC. (2022) Morbidity and mortality Weekly Report.

Ceserani. V. (2006). Theory of Catering. 11th Ed, Houghton Companies, London

Chiwara. N. (2020) Food safety and legislation concerns in developing countries.(Zimbabwe)

Codex. (2009) Hazard Analysis of Critical Control Points (HACCP) system and guidelines for its application.

Cruz A. G., Cenci S. A & Maia M. C. A. (2006) Quality Assurance requirements in produce processing. Trends Food Science.

Cunha D. T., Cipullo M. A. T., Stedefeldt E & Rosso V. V. (2015) :Food Safety Knowledge and training participation are associated with lower stress and anxiety levels of Brazilian Food handlers.

Cunha T. D., Soon M. D., Eluwole K.K., Mullan A. B., Bai L & Stedefeldt E. (2022) Knowledge, Attitudes and Practices model in food safety: Limitations and Methodological suggestions.

Djukic. D, Moracanin. V.S, Milijasevic. M, Babic. J, Memisi. N & Mandic, L (2016) Food safety and Sanitation.

Egan. A. T., Rukangira F., Mudege N & Muchuwei E. (2017) Prevalence of diarrhoea among children in urban and rural Zimbabwe.

Faour-Klingbeil. (2015) Investigation on the link between two different types of food business management to the food safety knowledge, attitudes and practices of food handlers was conducted in Beirut, Lebanon

Felgo P. K., Frimpong E.H & Essel-Ahun M. (2004) Salmonellae carrier status of food vendors in Kumasi, Ghana.

Felgo P & Sakyi K. (2012) Bacterial contamination of street vending food in Kumasi Ghana.

Food and Agriculture Organization. (1997) Food hygiene basic texts. Hazard Analysis of Critical Control Points (HACCP).

Food and Agriculture Organization. (2020) Farm to Fork Strategy.

Food Standards Agency. (2023) Avoiding cross-contamination.

Fung. K. T., Weis. M. S., Brennan. T. E., Ragland. K. D., Wiedmann. M & Moore. R.G. (2006) A multifaceted food safety intervention program to reduce foodborne illness at home.

Gadaga H. T., Samende K. B., Musuna C & Chibanda D. (2008) The microbiological quality of informally vended foods in Harare Zimbabwe.

Gates Foundation. (2019) Reinvent the toilet challenge.

Green R. L., Radke V., Mason R., Bushnell L., Reimann W.D ., Mack C. J., Motsinger D. M., Stigger T & Selman A. C. (2007) Factors related to food worker hand hygiene practices.

Hanson E. M. (2022) What is Food Contamination? Tips For Preventing Contaminated Food.

Hassan F. H & Dimassi H. (2014) Food Safety and handling knowledge and practices of Lebanese University Students.

Hashanuzzaman. M., Bhowmik S., Rahman S., Zakaria. A. M., Voumik. C. L & Mamu. A (2020) Assessment of food safety knowledge, attitudes and practices of fish farmers and restaurants food handlers in Bangladesh.

Hertzman L. J., Kitterlin M., Farrish J & Stefanelli J. (2013) the effect of food safety education and work experience on Knowledge, Attitude and Practices of University Students.

Hogan D. B., McCarron E. P., Curriero F. C., English P. T., Jones K. F., Tabor J & Yassi A. (2009) A systematic review of the health effects of exposure to urban sanitation and wastewater.

Hope. (2020) COVID-19, Hygiene Practices.

Hutton G., Bartram J & Haller L. (2008) Global costs and benefits of water supply and sanitation interventions to reach the millennium development goals.

Iliades C. (2023) What are common causes and types of foods that can trigger food poisoning?

Kafuti A. N., Ngugi J. N & Saumure K. (2014) A critical review of the use of observational assessment in food safety monitoring and compliance.

Kajongwe. C (PhD)., Machaka. H. T & Chibhoyi. D. (2021) Dynamics of Food Safety Management Strategies on Sustainability of Selected Manufacturing Small to Medium Size (SMEs) in Harare Metropolitan Province, Zimbabwe

Komorowski S. A., Patel. P & Mack P. D. (2022) Food Poisoning versus food allergy. Reference module in Food Science

Kouadri F. (2020) Microbiological Assessment of the Different Hand Drying Methods and Washroom Environment Cross-contamination.

Kwol S. V., Eluwole K. K., Avci T & Lasisi T. T. (2020) Another look into the knowledge, attitude and practices (KAP) model for food control: An investigation of the mediating role of food handlers' attitude.

Lin N & Roberts R. K. (2020) Using the Theory of Planned Behavioural intention: A systematic review and meta-analysis.

Little. C & McLauchlin. (2007) Food Poisoning and Food Hygiene, 7th edition, Hodder Education an Hauchette UK Company

Macheka. L., Manditsera. A. F., Ngadze. T. R., Mubaiwa. J & Nyanga. K. L. (2013) Barriers, Benefits and motivation factors for the implementation of food safety management system in the food sector in Harare Province, Zimbabwe.

Madura. A. (2013) Learning the basics about food safety 17.

Makwanda N. P & Moyo E. (2014) Food Safety Violations by Food Handlers in the Food Industry in Zimbabwe

Matsongoni H & Mutambara E (2021) Challenges Faced by The Informal Small to Medium Enterprises – A Case Study of The Manufacturing Sector in Zimbabwe

Meyer J. P., McQuaide M. S & Westerhoff. P. (2018) Wastewater infrastructure in the United States: Aging gracefully or crumbling.

Mullan B & Wong C. (2010) Using the Theory of Planned Behaviour to design a food hygiene intervention.

Muringai L. B., Murra D & Makwarimba F. T. (2016) Food Safety and Quality in Zimbabwe: Perceptions of consumers, food handlers and safety officials.

Naddifah Q., Muslikha A., Hidayat M., Soesillo B E T., Jannah F., Widianti D., Yusnita Y & Ernawati K. (2021) Relationship of knowledge and attitude with food handling practices: Asystematic review.

Ncube, Kanda A., Chijokwe M., Mabaya G & Nyamugure T.(2020) Food Safety Knowledge, Attitude and practices of restaurant food handlers in a low-middle-income country.

Njaya. T. (2014) Operations of Street Food Vendors and Their Impact on Sustainable Urban Life in High Density Suburbs of Harare, In Zimbabwe

Nyawo T., Kesa H & Onyenweaku E. (2021) Food Safety and Hygiene: Knowledge, Attitude and Practices among food handlers.

Outbreak Investigation of Listeria: Ice Cream. (2023) Outbreaks of Foodborne illness.

Osaili M. T., Obeidat A. B., Hajee A. W & Al-Nabulsi A.A. (2017) Food Safety Knowledge among food service staff in hospitals in Jordan.

Pswarayi. F., Anthony N., Mutukumira. N. A., Chipurura. B., Gabi. B & Jukes. J. D. (2014) Food control in Zimbabwe: A situational analysis

Reardon. M. A., Fenster. S. M., Ries. A. A., Lekas. J. E., Wojcik. R. S & Mahon . B. E. (2006) Impact of self-reported food safety practices on the risk of foodborne illnesses. Clinical Infectious Diseases.

SADC. (2012) Regional Food Safety Policy.

Saf F. J. I. (2021): Italian Journal of Food Safety.

Sithole Z., Juru T & Tshimanga M. (2017) Food borne illness amongst health care workers, at a Central Hospital, Harare, Zimbabwe 2016: a retrospective cohort study.

Travel Planner. (2020) Ifo about Rusape, (Zimbabwe).

UNICEF. (2017) Sustainable Development goal 6 Ensure availability and sustainable management of water and sanitation for all.

Vo H.T., Le H.N., Le N.T.A., Minh T.N.N & Nuorti P.J. (2015) Knowledge, attitudes, practices and training needs of food-handlers in large canteen in Southern Vietnam.

Walker S., Duffy. P. R., McElroy L.L., Meyer J. P., Westerhoff P & McQuaide M. S. (2017) The Nation's aging water infrastructure. Environmental Science and Technology.

WHO. (2015) Sanitation and Health

WHO. (2023) Weekly Bulletin on outbreaks and other Emergencies: Week 38: 18-24 September 2023. Published 15 October 2023.

WHO. (2023) Weekly Regional Cholera Bulletin: 28 August 2023 (Data Reported : as of 27 August 2023). Published 8 September 2023.

WHO. (2023) Weekly Bulletin on outbreaks and other Emergencies: Week 28: 10-16 July 2023. Published 21 July 2023.

WHO. (2022) Food Safety.; Codex Alimentarius.

Wilna O & Egal A. (2016) Food Quality and Food Safety.

World Population Review. (2023)., Population of Cities in Zimbabwe.

Young I., Greig J., Wilhelm J B & Waddell A. L. (2019) Effectiveness of Food Handler Training and Education Intervention: A systematic Review and Meta-Analysis.

Zanin M. L., Cunha T.D., Rosso V.V., Caprilse D.V & Stedefeldt E. (2017) Knowledge, attitudes and practices of food handlers in food safety: An integrative review.

Zvenyika. F. (2017) The Knowledge, Attitudes and Practices, and Compliance Regarding the Basic Prerequisite Programmes (PRPs) of Food Safety Management Systems of Food Service Workers in Boarding Schools and Restaurants in Masvingo Province, Zimbabwe.

APPENDICES

APPENDIX I: QUESTIONNAIRE

My name is **Samantha Musende (B201717B)** a part 4 student at Bindura University of Science Education pursuing an Honours Degree in Safety, Health and Environmental Management. I am conducting a study on food safety and hygiene in registered food restaurants of Rusape Town. I am kindly seeking for your assistance in answering the interview questions below. This information will only be used for academic purposes. Your cooperation will be greatly appreciated.

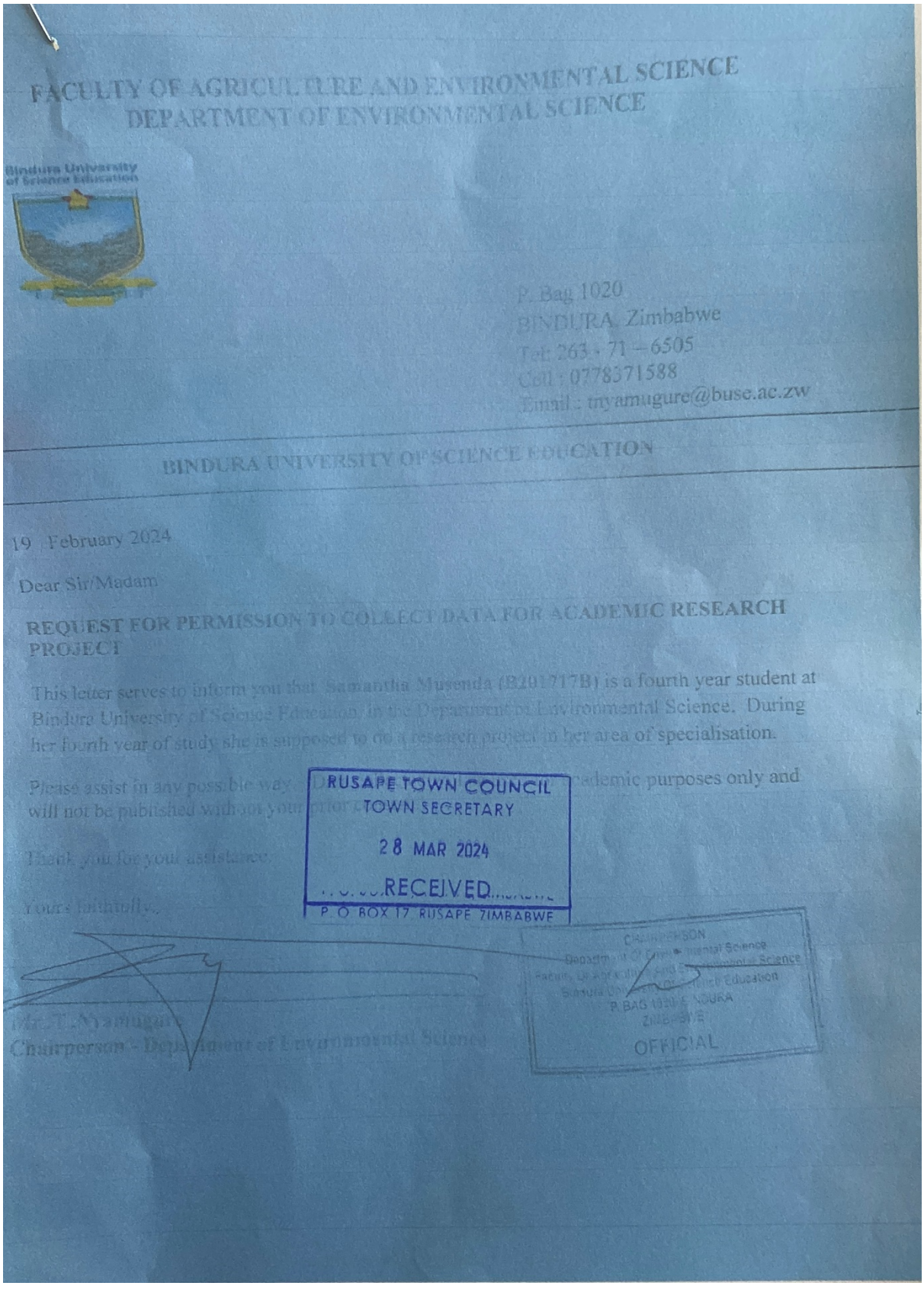
Section 1:	**Tick where applicable**	
1. Highest Educational Level/ Qualification		
Illiterate		
Primary		
Secondary		
Tertiary		
2. Occupation		
Cleaner		
Cook		

Waiter/ Waitress			
Supervisor/ Manager			
3. Years of work experience			
Below 1 year			
Between 1-5 years			
Between 5-10 years			
Above 10 years			
Section 2: Food Safety Attitude			
4. The most important part of my job is safe food provision.	Yes No		
5. Learning about food safety through training courses is important.	Yes No		
6.Thorough washing fruits and vegetables under running water is not necessary to prevent food poisoning.	Yes No		
7.Well cooked food is free from contamination.	Yes No		
8.It is necessary to check the shelf life of food at the point of delivery.	Yes No		
9.A food handler cannot perform their duties when they have abrasions or cuts without wearing gloves.	Yes No		
10.Medical examinations for food handlers shall be conducted in every six months.	Yes No		
Section 3: Food Safety Knowledge			
	Agree	Disagree	Don't Know

11.Cleaning or sanitizing of utensils reduces the risk of food contamination?			
12. Reheating of cooked foods contribute to food-borne illness?			
13. Is washing hands with soap and running water necessary before preparing food and snacks?			
14. Cross-contamination is when micro-organisms from contaminated food are transferred by food handlers or sharing kitchen utensils?			
15. Unhealthy food handlers carry food-borne pathogens or bacteria?			
16. Keeping food at refrigerator temperature does not prevent food poisoning?			
17. Should there be a toilet at the food premise?			
18. Should there be running safe water at the food premise?			
<u>Section 4: Practices</u>			Tick where applicable
18. Which method do you use for hand washing?	Water only Water and soap Water and disinfectant Others…….		1 2 3 4
20. When do you wash your hands?	Before handling food After handling raw materials After visiting the toilet Others…….		1 2 3 4

21. what do you use when drying your hands	Air Drier Communal Towel Frisk Drying Others…….	1 2 3 4
22. How do you keep your nails?	Short and dirty Long and dirty Long and clean Short and clean	1 2 3 4
23. Are you provided with uniforms at work?	Yes No	
24. Which uniforms are provided at your workplace?	Head gear (e.g. hairnets) Aprons Gloves Safety shoes Others ……	1 2 3 4
25. How do you keep them ?	Clean Dirty	
26. Have you received training on food safety in the last 12 months?	Yes No	
27. Do you receive on the job induction before starting work?	Yes No	
28. Do you have the following habits?	Talking over food Smoking whilst handling food Sneezing over food Smelling foods	1 2 3 4

APPENDIX II: APPROVAL LETTER FROM RUSAPE TOWN COUNCIL



FACULTY OF AGRICULTURE AND ENVIRONMENTAL SCIENCE
DEPARTMENT OF ENVIRONMENTAL SCIENCE

Bindura University of Science Education

P. Bag 1020
BINDURA, Zimbabwe
Tel: 263 - 71 – 6505
Cell : 0778371588
Email : tnyamugure@buse.ac.zw

BINDURA UNIVERSITY OF SCIENCE EDUCATION

19 February 2024

Dear Sir/Madam

REQUEST FOR PERMISSION TO COLLECT DATA FOR ACADEMIC RESEARCH PROJECT

This letter serves to inform you that Samantha Musenda (B201717B) is a fourth year student at Bindura University of Science Education in the Department of Environmental Science. During her fourth year of study she is supposed to do a research project in her area of specialisation.

Please assist in any possible way. [illegible] academic purposes only and will not be published without your prior [illegible]

Thank you for your assistance.

Yours faithfully,

Mr. T. Nyamugure
Chairperson - Department of Environmental Science

RUSAPE TOWN COUNCIL
TOWN SECRETARY
28 MAR 2024
RECEIVED
P O BOX 17 RUSAPE ZIMBABWE

CHAIRPERSON
Department of Environmental Science
Faculty of Agriculture and Environmental Science
Bindura University of Science Education
P BAG 1020 BINDURA
ZIMBABWE
OFFICIAL